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It Takes a Conscious Effort: Helping Society Benefit from the Open Science Movement

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The open science movement, with its goal of making data and conclusions more transparent and accessible, has the potential to transform both science and society.[1] Although open data may be beneficial for scientists, without interpretation this information is virtually useless for decision makers charged with setting science-based policy, much less for the general public.[2,3] A recent commentary in *Environmental Health Perspectives* asserts that making open science relevant for society will require partnerships to share knowledge between scientists and the public, journals, research institutions, and government agencies.[4]

The authors launched their study after reviewing calls from prominent science organizations to facilitate access to scientific findings.[5,6] "We looked for methods on how to implement this goal in the open science documents, but we didn't see details on how to serve the public," says Kevin Elliott, a philosopher of science at Michigan State University and lead author of the commentary. In fact, a previous survey of 22 principal investigators in the fields of systems biology, synthetic biology, and bioinformatics revealed that most of these experts defined open science as practices that serve the scientific community, such as open access to journal articles and data.[7] Yet "most nonspecialists can't make sense out of technical articles and data," Elliott says.

Hoping to identify strategies to facilitate access to open science, Elliott and coauthor David Resnik, a bioethicist at the National Institute of Environmental Health Sciences, focused on the central concept of transparency. They distinguished between two different forms of transparency: one geared toward helping scientists share discoveries and improve reproducibility, and one focused on enabling decision makers and the public to make effective use of scientific information. Each form requires a different set of tactics to avail its audience of the benefits of open science.

"What may be most important for nonspecialists is being able to understand the significance of the research, its weaknesses or shortcomings, the value judgements associated with it, how it fits

Many members of the general public want to understand the limitations of scientific information but lack the technical expertise or science background to discern the nuances for themselves. Therefore, if open science is to have a positive impact on society, researchers must be prepared to interpret, synthesize, and present information in a readily accessible manner. Image: © iStockphoto/monkeybusinessimages.

in the broader context, and what the implications are," Elliott says. To achieve these goals, he and Resnik compiled a list of strategies for communicating science to this audience.

Scientists themselves can use social media and science communication websites such as https://theconversation.com to share their work in an accessible way. Journals can publish summaries or highlights of each article and host blogs for authors to discuss key results. And government agencies can develop initiatives to help decision makers make use of data. One example of this is SERVIR (https://servirglobal.net/), a joint effort by the National Aeronautics and Space Administration (NASA) and the U.S. Agency for International Development. This project helps decision makers in developing countries employ Earth observation data in solving challenges in food security, water resources, and natural disasters.

Elliott and Resnik point out that it takes a conscious effort to design mechanisms that enable the public to fully benefit from scientific research. Although many scientists want to give back to society, some worry that public engagement will take time away from publishing their work and thus advancing their careers, says Tracey Holloway, an air quality scientist at the University of Wisconsin–Madison. She currently leads the NASA Health and Air Quality Applied Sciences Team, which fosters collaboration between scientists, health organizations, and members of the public.[8] "Universities, scientific societies, and funding agencies can help change that culture by rewarding outreach," Holloway says—for example, by funding grants specifically for outreach tools.

"This paper gives us a framework to discuss how open science can transform the way science and society interact," says Raj Pandya, director of the American Geophysical Union's Thriving Earth Exchange.[9] "This is part of a transformative time in science that has the potential to open science up in ways that make it available to build a better future and to engage in a way that's more equitable and accessible than before."

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